

National Centre for Cold-chain Development

“MIDH Guidelines”

presented at Conclave for

**Nodal Officers for Cold Chain Development
(all States)**

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Integrated Pack house

- ❖ This component refers to modern Integrated pack-house with facilities for conveyer belt system for sorting, grading, weighing.
- ❖ Costs vary depending on design and throughput. This component is the most important as it serves as source / origin of the majority of products in the cold-chain.
- ❖ Modern pack-houses integrate with markets and are designed as initiators of cold chain and to initiate flow of post harvest produce into multiple supply systems including non-cold chain.



Precooling unit

- ❖ The component refers to a specialised cooling room that rapidly removes field heat from fresh produce after harvest while maintaining humidity for freshness - and thereby prepares the cargo for subsequent storage and shipping. Precooling or post-harvest cooling is one of the crucial steps in preparing fruits and vegetables for the extended cold-chain.



Cold Room (staging)

- ❖ This component is an insulated and refrigerated chamber which is a necessary combination for Pre-Cooling Unit and serves as a transient storage, while allowing the pre-cooler to be utilised for next batch load of incoming produce. A staging area is appended to the cold room.
- ❖ Such cold rooms are typically low rise structures, between 30 to 60 MT in size and found at pack houses, not intended for long term storage.



Cold Storage

- ❄ Is an insulated and refrigerated warehouse for protective storage of various goods. In case of horticulture, this helps take advantage of and continue post harvest life extension that is initiated at origin point or pack-house.
- ❄ Cold Storage unit Type-1 are basic type cold storages with large chamber sizes, having mezzanine floors which are designed for single temperature zone and are normally used for single or similar commodity types. Follow NHB-Type CS01 standard as guideline.
- ❄ Cold Storage Unit Type-2 are multiple chambered (>6 chambers) with each chamber of less than 250MT capacity. Each chamber is capable of being a differing temperature zone and the store is designed for unitised load handling with basic material handling equipment. Follow NHB-Type CS02 standard as guideline.
- ❄ Cold Storage Units Type-2 can also be designed for other specialised storage with add on technology for controlled atmosphere utility.

Cold Storage Types

1

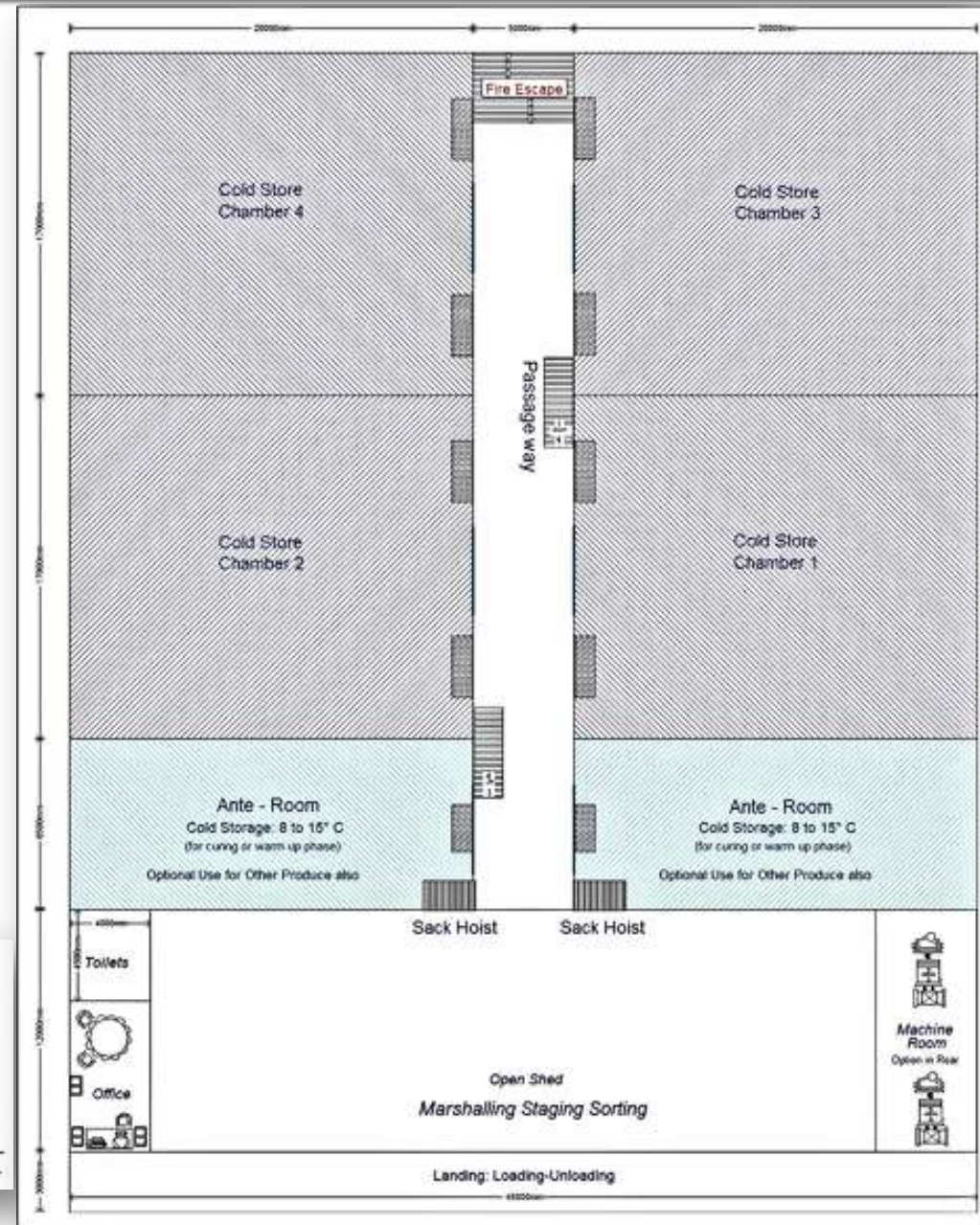
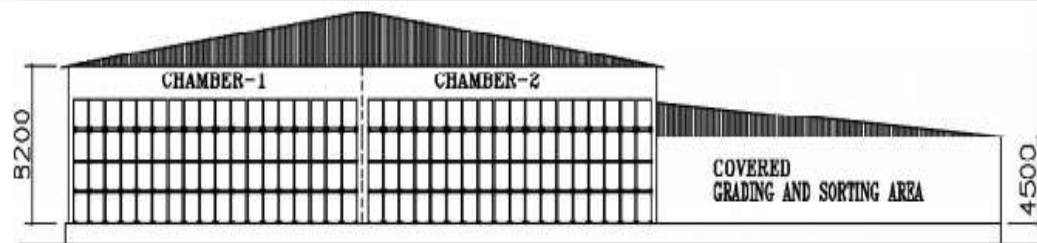


2



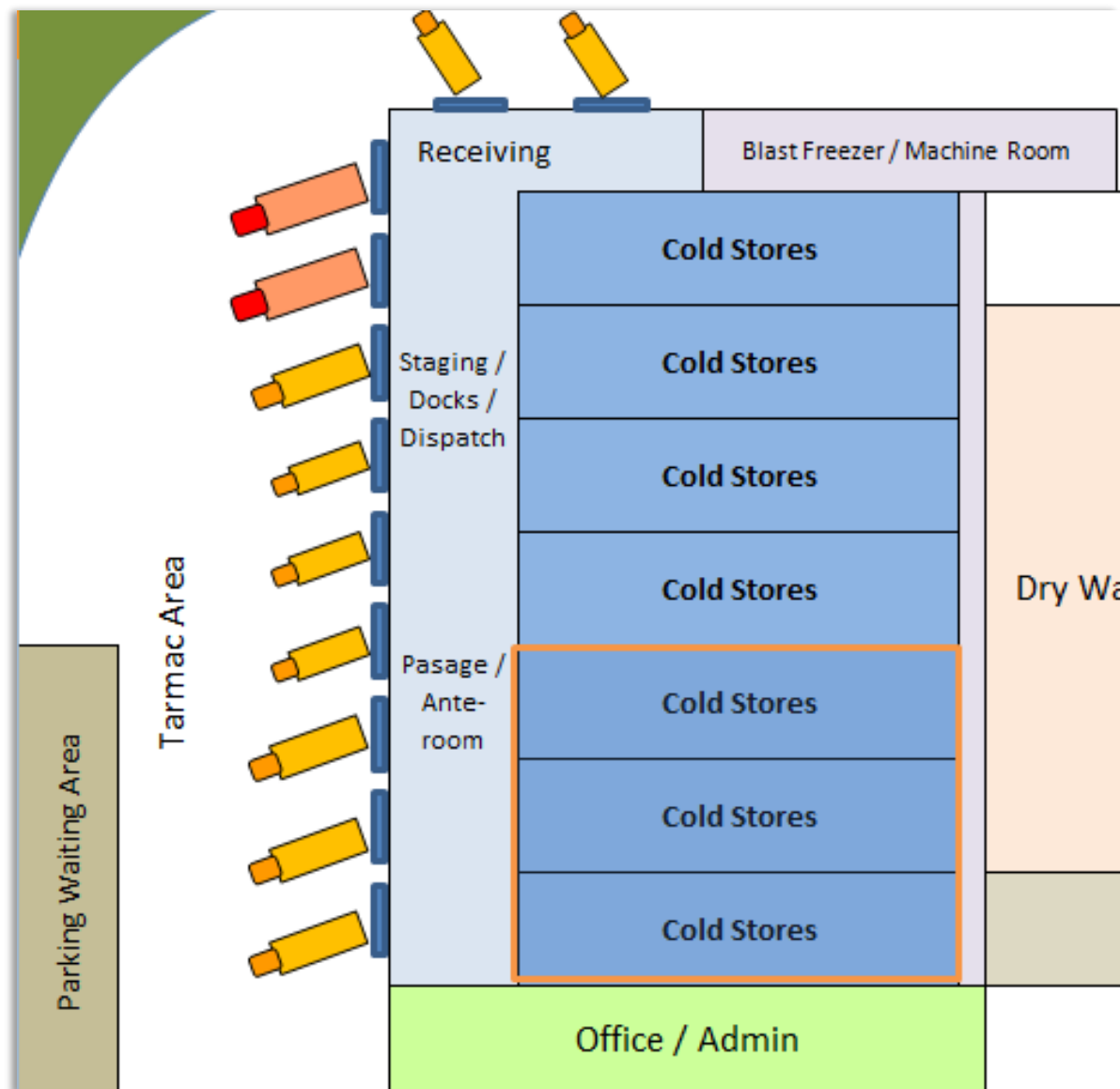
Schematic Cold Warehouse

- ❄ Large Chambers size (>250MT).
- ❄ Chambers could be multi-level with fixed or mezzanine floors.
- ❄ External open shed for marshalling / staging.
- ❄ Capable of multiple commodity but basic design for long term storage of single product in non-retail packages.



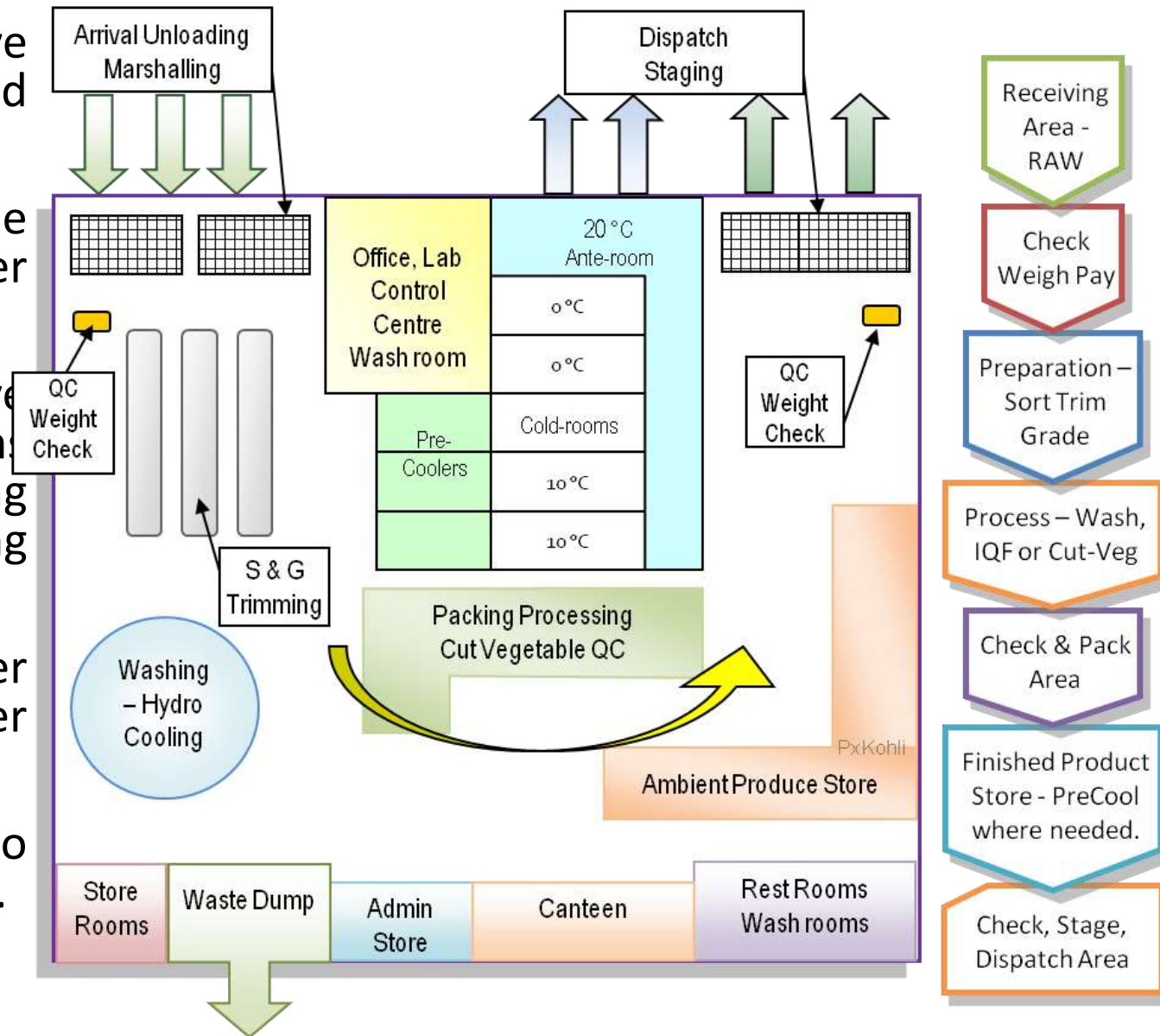
Schematic Multi Product Storage

- ❄ Multiple compartments, Temperature Chambers.
- ❄ Multi-Product capable.
- ❄ Able to Cater to Horticultural and non-Horti cargoes.
- ❄ Distribution Capability when around Consumption centres.
- ❄ Enclosed handling area (ante-room for marshalling and staging)
- ❄ Chamber sizes of less than 250 MT, designed for retail ready packaged produce.



Schematic Modern Packhouse

- ❖ Pack-House could have multiple pre-coolers and Cold Rooms.
- ❖ Larger Area would be dedicated to other process flows.
- ❖ Cold Rooms would have appended ante-rooms leading into staging (unloading/loading areas).
- ❖ Designed for other produce flow into other supply lines.
- ❖ Design could cater to multiple produce types.



Ripening Chamber

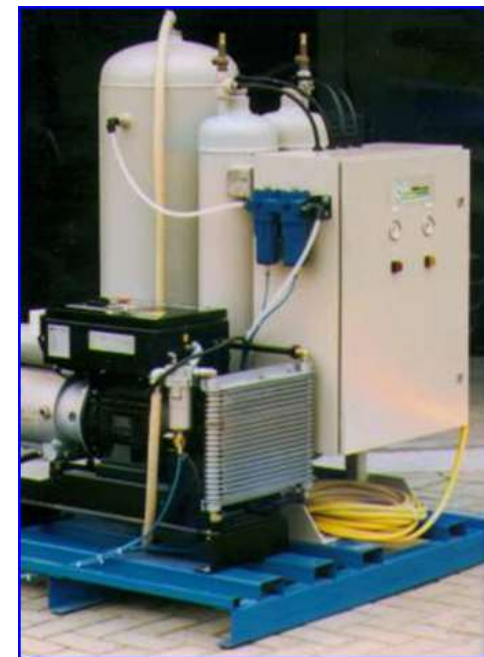
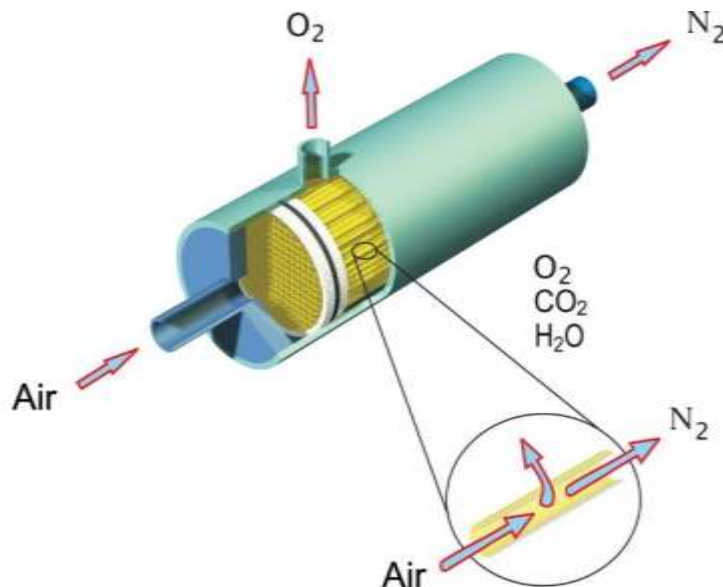
- ❄ Specialised mild chill chamber (16 to 18 °C) with facility for controlled dosing of fruits (with ethylene) to trigger the ripening process.
- ❄ The component includes multiple insulated rooms (for mild chill), with appropriate low cost cooling system, ethylene injection system, and other controls.
- ❄ Normally a set of four rooms is one ripening facility to complement a daily output of fruit (ripening is typically a 4 day cycle).



- ❄ Is a last mile facility - Ripened fruits are not conducive to long distance transport.
- ❄ Refer to the existing technical document NHB-CS-Type04 for details.

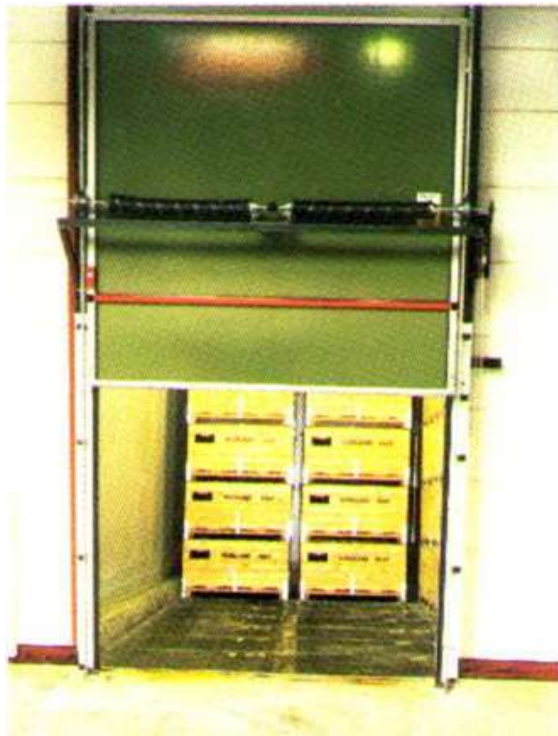
CA Generator

- ❗ The component name CA generator refers to specialised equipment that produces inert gas (normally Nitrogen) for in use Controlled Atmosphere (CA) enabled cold stores.
- ❗ The Price may vary depending on the type of technology, and on the output capacity in litres of control gas per unit time. The output must match the chamber volumes and maximum permissible time to bring produce under desired parameters.



Specialised CA Doors

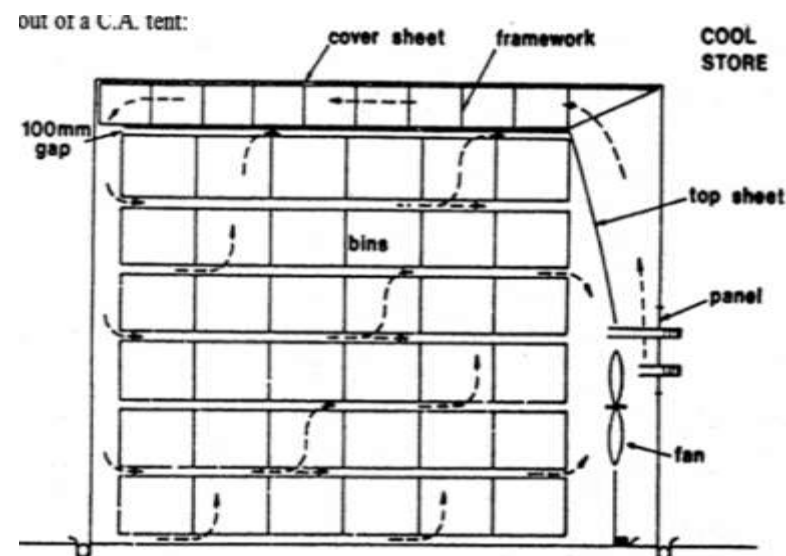
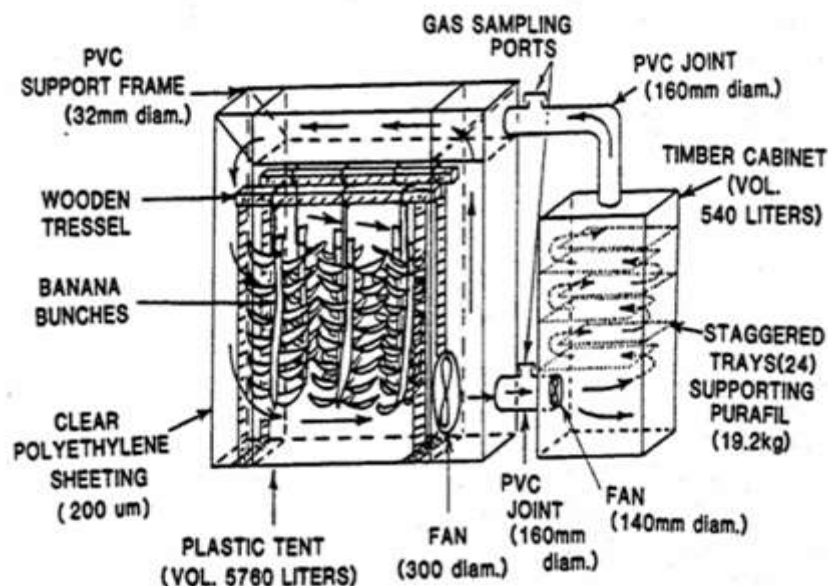
- ❖ Specialised CA doors are specifically designed for sealing chambers under controlled atmosphere condition.
- ❖ The indicative norm are for a CA door of size 2.5 x 3 mtr, with associated inspection windows, lock and seal. Other sizes may be used.



Ref: MIDH Guidelines, Annexure V, Appendix II,(ii)

CA Tent

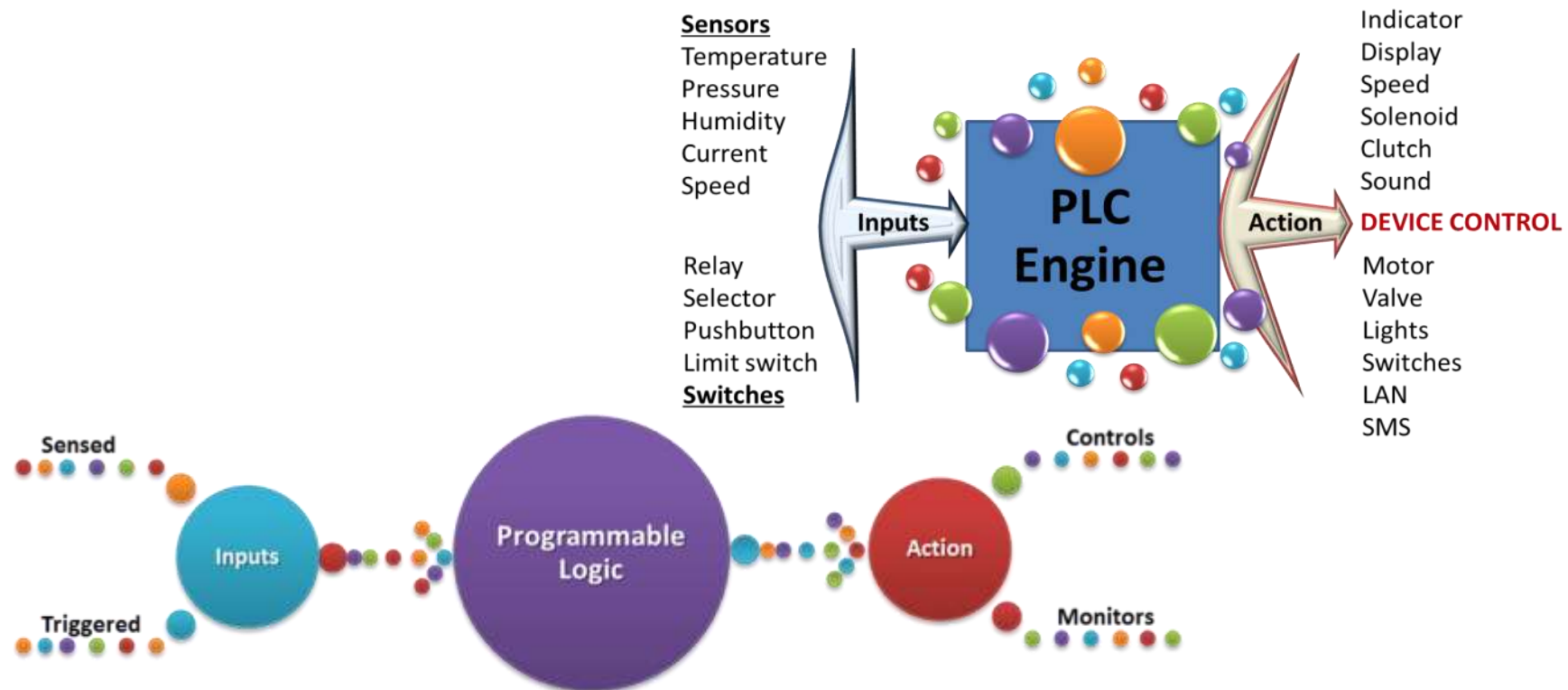
- ❏ This component refers to an airtight enclosure made of impermeable material such as polyethylene PVC, Mylar so as to serve as a sealed enclosure which can maintain controlled atmosphere parameters for storing perishable produce.



Ref: MIDH Guidelines, Annexure V, Appendix II,(iii)

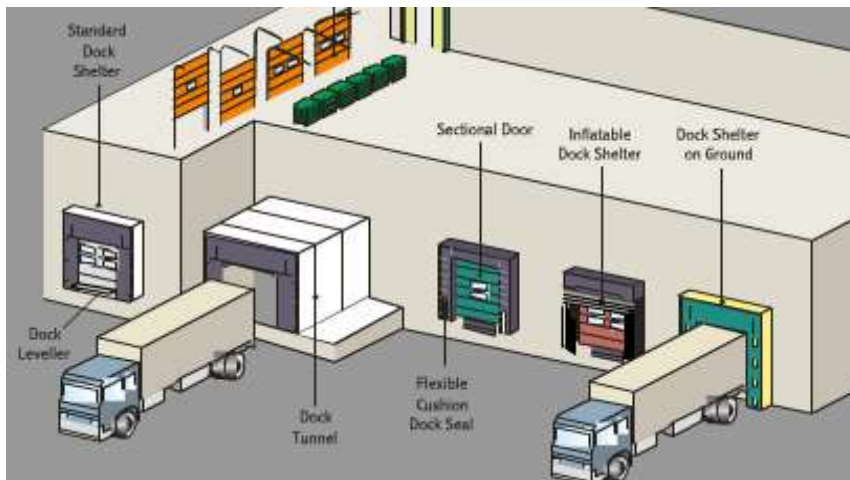
PLC System (Automation)

- ❖ A Programmable Logic Controller comprises electronic hardware with pre-programmed software, physical refrigeration controls and various sensors so as to automate operations of machinery.
- ❖ The Indicative price of PLC depending on the type of processor and no of inputs& outputs and can be as low as Rs 15000 per chamber



Docks & Leveller

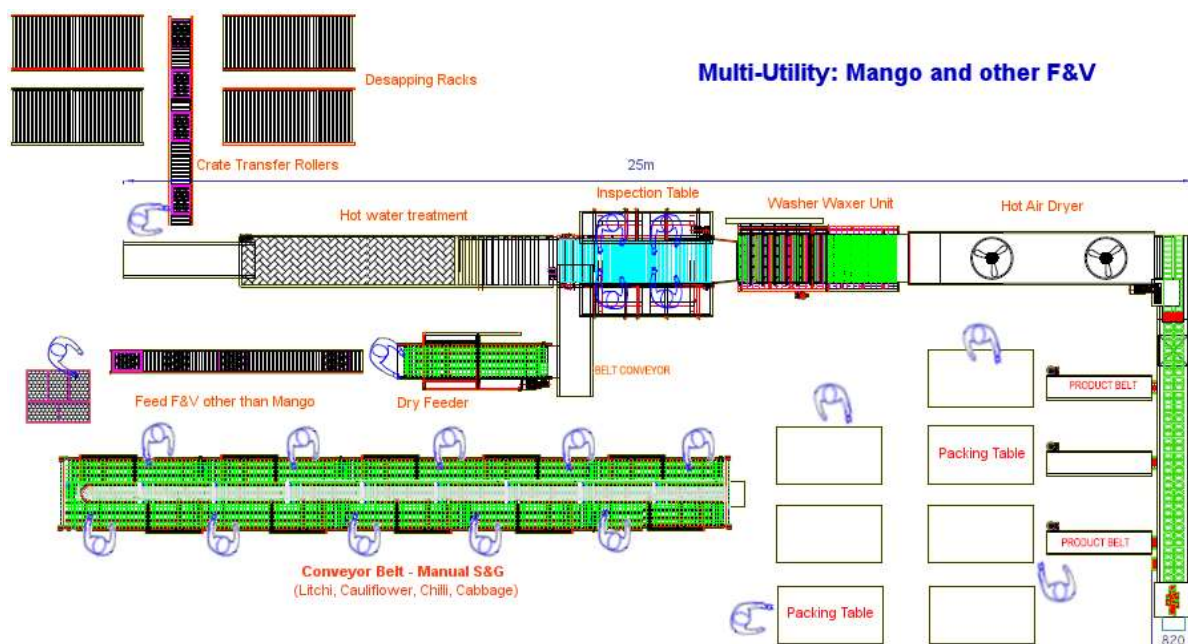
- ❄ Is an adjustable metal ramp designed to bridge the gap between the cargo bed of a transport vehicle and the loading platform of a cold-store, the dock shelter incorporates a sealing system and an inner insulated door – collectively this is also known as a docking bay. It consists of: a) Adjustable ramp b) Dock door c) Dock shelter d) safety controls
- ❄ The indicative norms are for a sheltered dock door of size 2.5x3 mtr with a leveller for 9T point load.



Ref: MIDH Guidelines, Annexure V, Appendix II, (v)

Special Packaging Line

- ❗ This component refers to a group of integrated special purpose equipment that combine produce with packaging inputs and output a ready to handle packaged product. Each packaged product must have farm code labeling with traceability norms.
- ❗ The indicative cost of a packaging line would depend on the length of the line and the throughput.



Including Equipment Examples for other F&V



Ref: MIDH Guidelines, Annexure V, Appendix II, (vii)

High Reach Material

- ❖ A High Reach Truck is a mechanized industrial lift truck equipped with a vertically elevating load carriage frame and horizontal load forks for lifting and positioning the pallets.
- ❖ The indicative price may depend on the type of lifting equipment and extent of lifting capability.
- ❖ At single bulk commodity use, cargo lift and platform riser/stacker may also be used.



Modernisation of Refrigeration

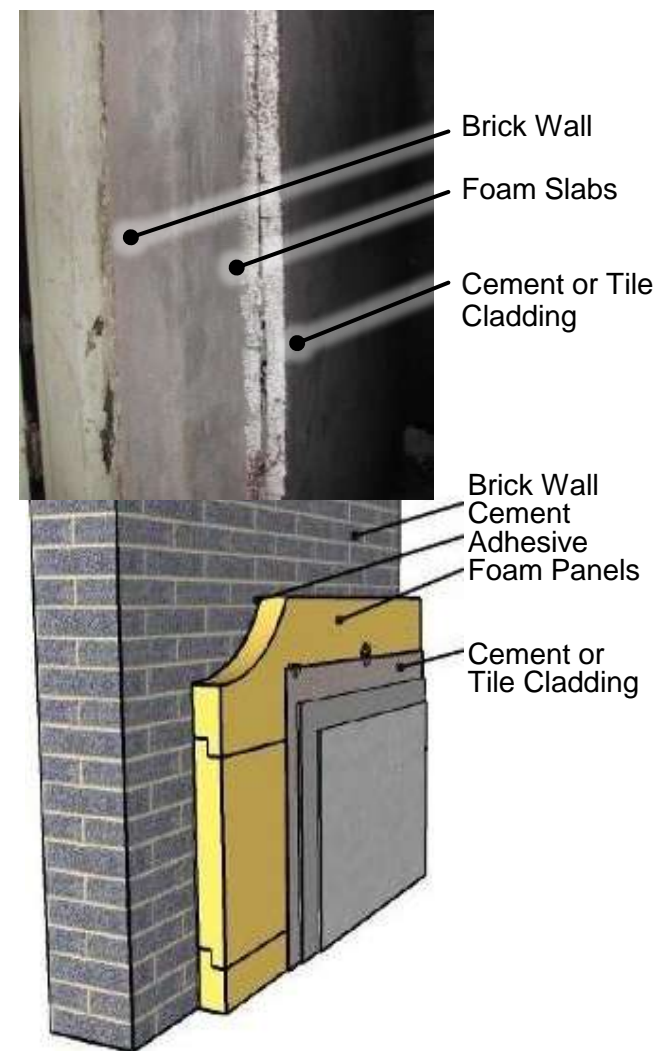
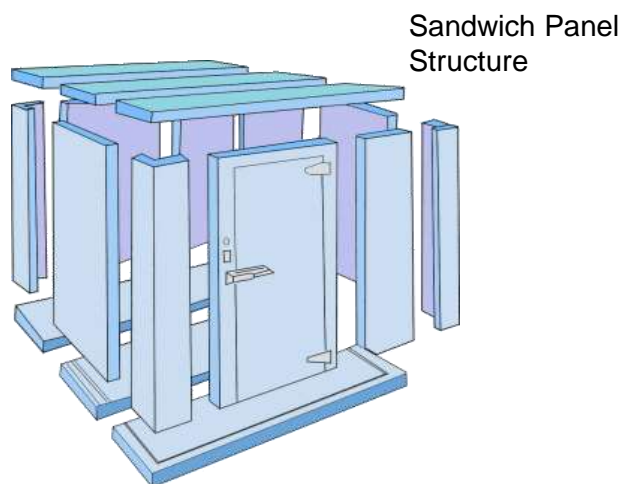
- ❖ The component “Modernisation of Refrigeration” includes technology upgradation of Evaporators and Compressors. Mere replacement of the same technology does not qualify.
- ❖ The cost for modernisation would depend on the type of technology used. Any modernisation should result in >5% energy savings.



Ref: MIDH Guidelines, Annexure V, Appendix II, (ix)

Modernisation of Insulation

❄️ This component relates to the fixed insulating barrier used as peripheral and intermediary walls, roofs and floor of cold-chain facilities. The component applies to modernising of such insulating medium, where the modernisation results in a superior thermal barrier leading to reduction in energy loss.



Ref: MIDH Guidelines, Annexure V, Appendix II, (x)

Reefer Container

- ❖ A reefer container describes a multi-modal insulated container with integrated refrigeration equipment. Unlike fixed body trucks, reefer containers can be released from the trailer chassis and stationed on site .
- ❖ These allow domestic multi-modal movement (waterway, roadway, railway)



Ref: MIDH Guidelines, Annexure V, Appendix II, (xi)

Advanced Grader

- ❖ This component refers to a sorting and grading line which incorporates advanced technology such as acoustic and/or optical sensing systems that can segregate produce on the basis of specific size, shape, colour.



Stacking System: Racking System

- ❖ This component refers to storage mechanism such as racks, bins and pallets for holding unitized cargo in storage and transport. These are constructed with metal, wood, plastic of specifications suited for temperature controlled atmosphere.



Ref: MIDH Guidelines, Annexure V, Appendix II, (xiii)

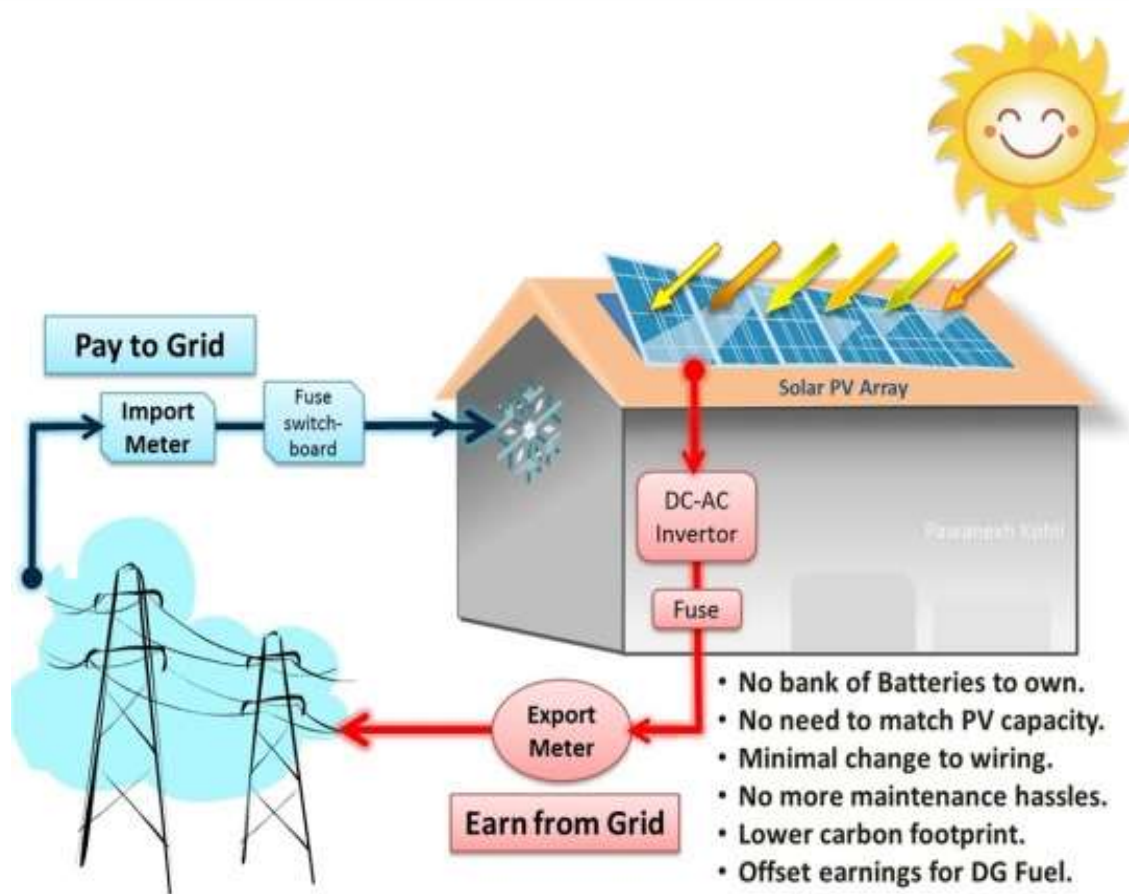
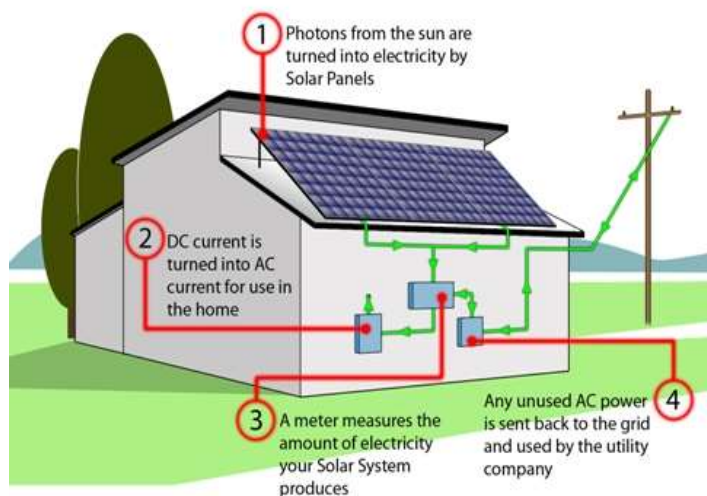
Retail Shelf

- ❄️ These are temperature and/or humidity controlled cabinets or shelves that help in merchandising of fresh horticulture produce. They consist of multi-desks, roll ins, single desks etc.



Ref: MIDH Guidelines, Annexure V, Appendix II, (xiv)

Alternate Technology- Solar Photovoltaic

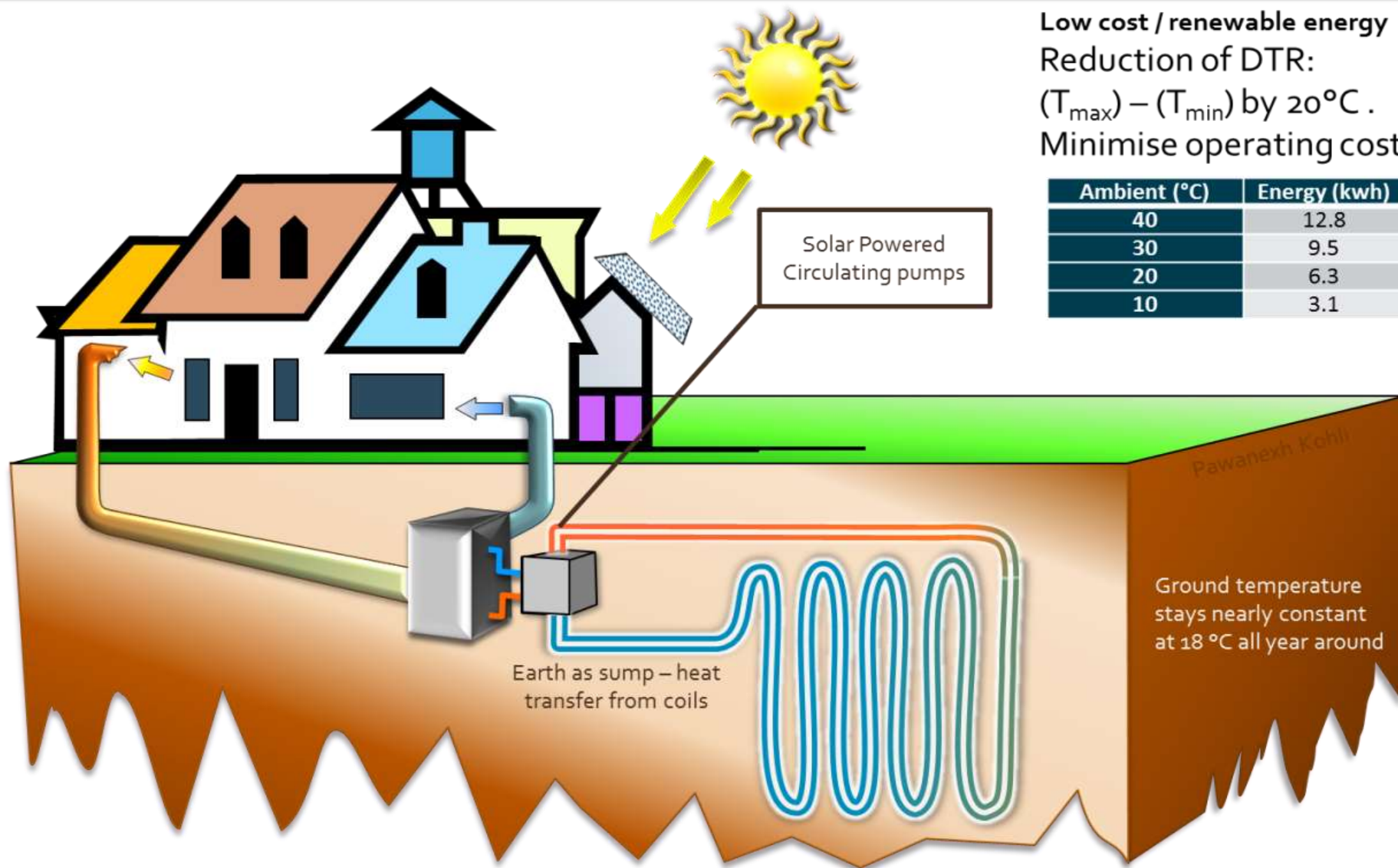


❗ This component includes various alternate energy options such as alternate energy source, thermal energy banks or other non-conventional technologies that can be used to operate the equipment or serve as an energy buffer at a cold chain facility. The various types are: 1) Solar PV; 2) Solar Thermal; 3) Geo-thermal; 4) Phase Change Material

❗ The indicative price may vary and technology aspects will be guided as per MNRE guidelines.

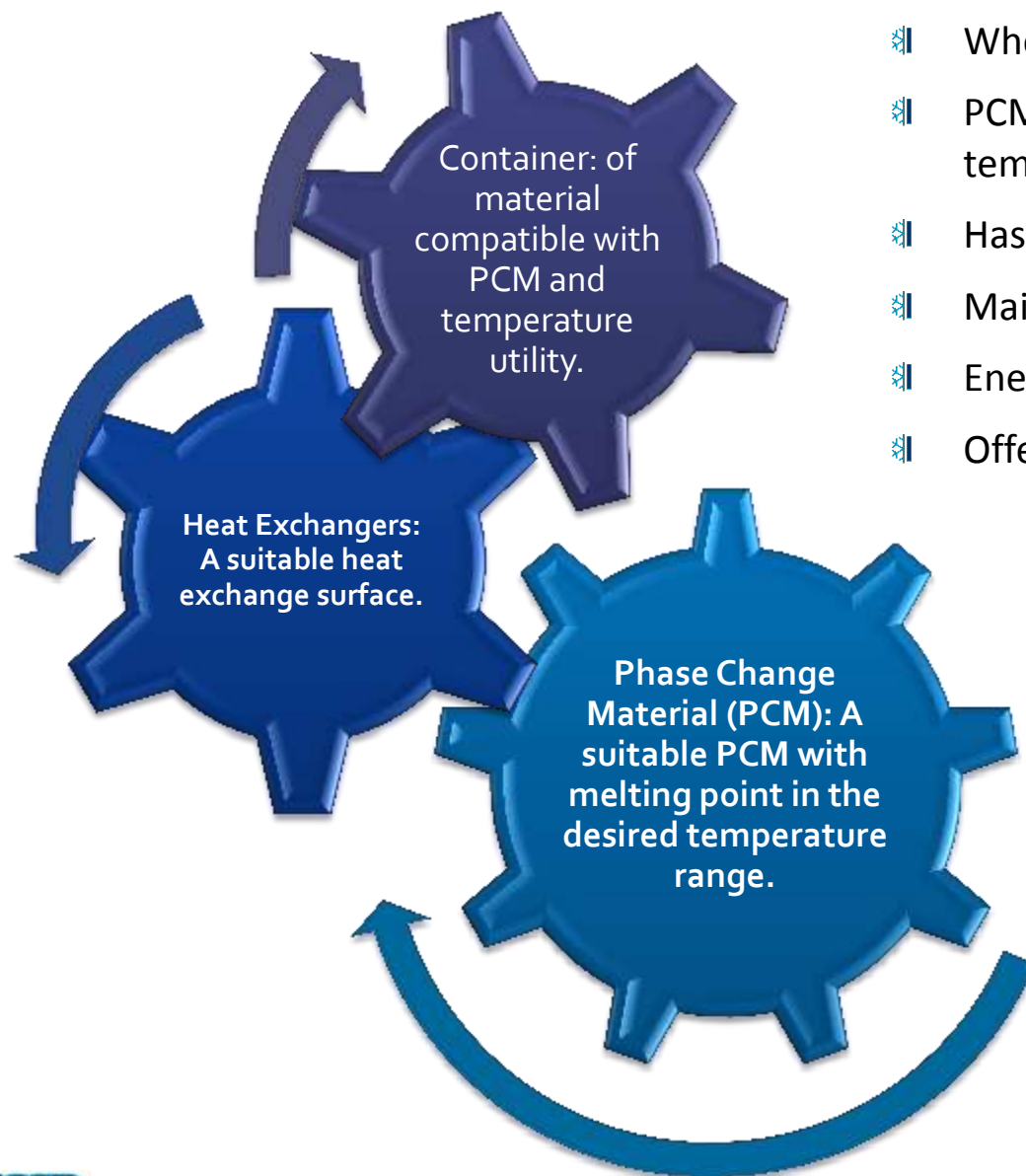
Ref: MIDH Guidelines, Annexure V, Appendix II, (xv)

Alternate technology- Geothermal Energy

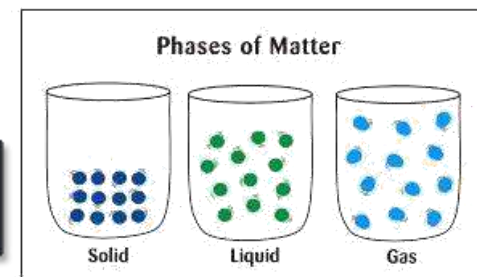
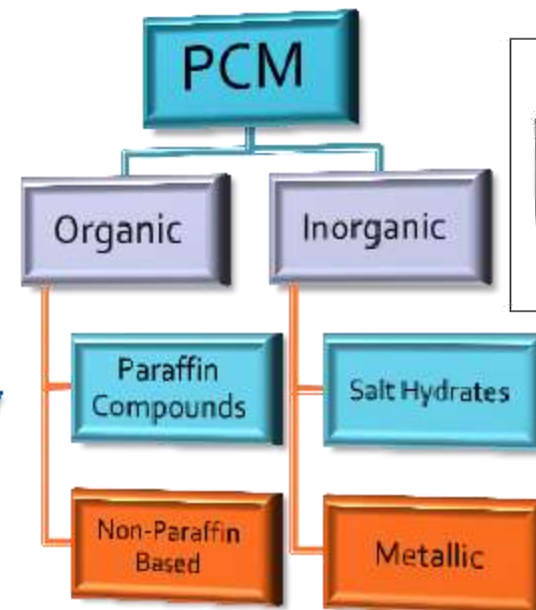


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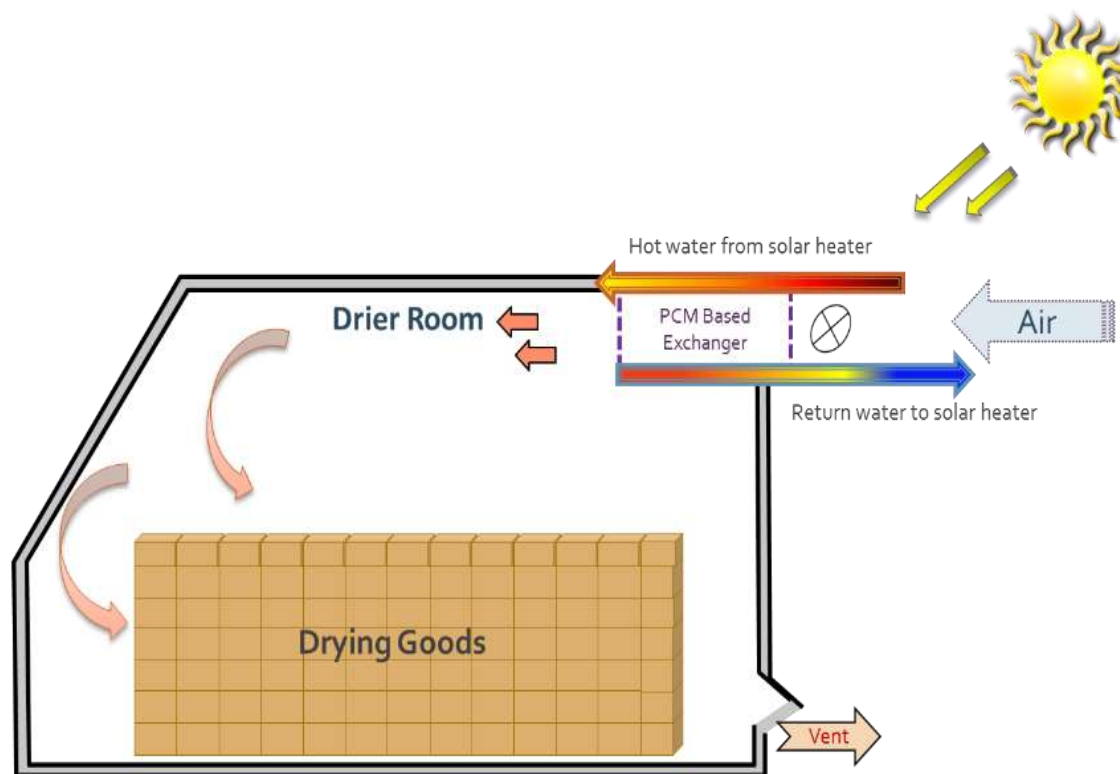
Thermal Inertia



- ❄ When water freezes, energy is released to surroundings.
- ❄ When ice melts, energy is absorbed from surroundings.
- ❄ PCM is 'ICE' like behaviour at controlled, desired temperature levels (example: ice that melts at +20 °C)
- ❄ Has tendency to retain or resist any energy level change.
- ❄ Maintains a desired steady state temperature profile.
- ❄ Energy stored and output from 170 KJ to 300 KJ per kg.
- ❄ Offers a wide array of thermal applications.



Alternate technology- Phase Change Material



- PCM bank serves as a thermal 'battery'.
- Continuance in heat transfer and to drying process.
- Low cost energy source, renewable.

Type	Operating Temp °C	Latent Heat (kJ/Kg)	Flammability	Qty per kWh (kg)
Negative	-25 to -26	205	No	23
Negative	-22 to -24	210	No	18
Negative	-17 to -21	200	No	18
Negative	-7 to -5	230	No	16
ICE	-1 to +1	300	No	12
Positive	21 to 23	185	No	19
Positive	23 to 25	185	No	19
Positive	27 to 29	190	No	19
Positive	57 to 59	250	No	15
Positive	87 to 89	180	No	20

Guidance

- ❖ Extant documents created to standardise the subsidy system shall continue to apply while approving cold storage projects.
- ❖ Revisions to technical standards and adherence protocols shall be updated by National Centre for Cold-chain Development (NCCD) as necessary when improved technologies and efficiencies are introduced / understood / approved.
- ❖ NCCD will guide policy and standards for development of integrated cold chain in the country and will assist on policy and process matters.
- ❖ Close collaboration with other Ministries and Departments shall be the norm.

Thank You



National Centre for Cold Chain Development

Nodal Centre for Nationwide Cold-chain Development

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